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(54) **DRILLING TOOL**

BOHRWERKZEUG

OUTIL DE PERÇAGE

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Description**PRIORITY**

[0001] This application claims priority to and the benefit of French Application No. 1757781, filed August 22, 2017.

TECHNICAL FIELD

[0002] The invention relates to a drilling tool according to the preamble of claim 1. Such a drilling tool is known from DE 20 2010 011308 U1.

PRIOR ART

[0003] A drilling tool is a tool that allows a hole to be drilled in a wall by means of a drill bit. Conventionally, such a tool is portable and comprises a handle for manipulating the tool and a front end for the attachment of the drill bit, the outside diameter of the drill bit being dependent on the desired diameter of drilling.

[0004] There are various types of drill bit and drill bit attachment means. For example, drill bits comprising a drilling portion cut into a helix and a cylindrical portion for attachment to the front end of the tool, which comprises jaws for clamping this cylindrical portion, are known. This type of drill bit and tool is generally reserved for a mode of drilling without hammer action, the rotation of the drill bit about its axis alone being used to drill a hole.

[0005] Hammer action drill bits and drilling tools are also known. The portion for attaching the drill bit to the front end of the tool is then of SDS (SDS+, SDSmax, etc.) type well known to those skilled in the art, which allows the drill bit to be both rotated about its axis and imparted a succession of translational movements along its axis, which give rise to impacts into the wall and make it easier to create the hole, particularly in a wall made of hard material such as concrete.

[0006] It is known practice to use a drilling tool to screw a fastener such as a screw. To do that, all that is required is for the drill bit to be removed from the jaws of a tool for example and replaced by an adapter which is clamped by the jaws of this tool, in place of the drill bit, and which carries a screw-driving fitting designed to drive the fastener. However, in the case of a hammer action drilling tool, or a drilling tool designed to operate in a drilling mode with a hammer action, this is not currently possible or becomes difficult because of the SDS type of connection used in the aforementioned drill bits.

[0007] Document US-A-4 468 826 describes a hammer drilling tool which is not equipped with a connection of SDS type. Moreover, even though the tool is able to be fitted with an accessory around the drill bit, this tool is not configured to adapt operating parameters according to the equipment (drill bit or accessory) used.

[0008] Document US-A-5 409 333 describes a drilling tool which is not fitted with an SDS type connection and

which is not configured to transmit a hammer action.

[0009] The present invention seeks to improve on the current technology in a way that is simple, effective and economical.

SUMMARY OF THE INVENTION

[0010] The invention thus proposes a drilling tool according to claim 1, configured to operate in two drilling modes, respectively with and without hammer action, said tool comprising a front end equipped with a rotating part for mounting a drill bit by means of an SDS-type push-fitting, characterized in that said rotating part comprises means for removable attachment to a first longitudinal end of a tubular extension, the tubular extension being configured to extend along and around a drill bit mounted in the rotating part and comprising a second longitudinal end configured to bear a screw-driving element, such that the tool can be used for a screw-driving operation even when it is equipped with the drill bit.

[0011] It will thus be appreciated that the extension can be mounted on the tool which can remain fitted with a drill bit. There is therefore no need to remove the drill bit or even to fit a new front end on the tool in order to be able to attach the extension to it. This makes it possible to significantly simplify the use of the tool for a screw-driving operation, only the extension having to be handled in order to switch from a drilling operation to a screw-driving operation, and vice versa. This mode can be used to perform this screw-driving operation. Preferred embodiments of the present invention are defined in the dependent claims.

[0012] The tool according to the invention may comprise one or more of the following features:

- said first end has a polygonal shape in cross section;
- said connection means are configured to engage with said first end by means of a male-female push-fitting;
- said connection means comprise a tubular body configured to extend around part of the drill bit and around said first end;
- said body has a ball retention system configured to retain said first end once connected, said ball retention system comprising at least one ball that is borne by said body and is configured to cooperate by engagement with at least one recess provided on said first end;
- said body comprises an internal annular groove for receiving a first O-ring seal configured to engage with said drill bit;
- said front end comprises a second O-ring mounted between said body and SDS-type push-fitting means for the drill bit;
- the tool comprises a first, mode, selector for selecting between said drilling modes with and without hammer action, and a second, speed, selector for selecting between a first speed, suitable for hammer drill-

ing with a high impact force and fast screw driving, and a second, lower, speed, suitable for slow, high-torque screw driving and hammer drilling with a lower impact force;

- the tool comprises a brushless motor for driving the rotation of said rotating part, this motor being connected by a microcontroller to said first and second selectors and to a trigger for actuating the tool;
- said rotating part is able not to transmit hammer actions to said extension.

[0013] The present invention also relates to an assembly according to claim 11 comprising a tubular extension for a tool according to claim 1, said extension having an elongate shape and comprising a first longitudinal end for removable attachment to said connection means of the front end of the tool, and a second longitudinal end configured to bear at least one screw-driving bit, the extension comprising a longitudinal internal bore which is open at said first end and of which the length and the external diameter are configured such that the extension can be mounted on the tool even when the latter is equipped with a drill bit.

[0014] The assembly according to the invention may comprise one or more of the following features:

- said bore comprises at least two cylindrical portions of different diameters, including a first portion of larger diameter located toward said first end;
- said second end is configured to receive at least one element affixed by male or female push-fitting, or even two elements affixed by male and female push-fitting, respectively;
- said second end has a polygonal shape in cross section.

BRIEF DESCRIPTION OF THE FIGURES

[0015] The present invention will be better understood and further details, features and advantages thereof will become more clearly apparent from reading the following description, given by way of nonlimiting example and made with reference to the attached drawings in which:

- figure 1 is a schematic perspective view of a drilling tool according to the invention equipped with an extension, the drilling tool being depicted in part;
- figure 2 is a schematic perspective and sectioned view of the tool of figure 1;
- figure 3 is a schematic perspective view of the tool of figure 3, the extension having been removed from the front end of the tool;
- figure 4 is a schematic view in axial section of part of the front end and of the extension of the tool of figure 1;
- figure 5 is a schematic and exploded perspective view of the elements of figure 4;
- figure 6 is a schematic and perspective view of an

alternative form of embodiment of a drilling tool according to the invention equipped with an extension, the drilling tool being depicted in part and the extension being removed from the front end of the tool; and

- 5 - figure 7 very schematically depicts an electronic circuit for the control of the tool.

DETAILED DESCRIPTION

10 **[0016]** Figures 1 to 5 depict a first embodiment of a drilling tool 10 according to the invention, this tool being depicted in part.

[0017] Conventionally, such a tool 10 is portable and therefore comprises a handle for a user to hold and a front end 12 for mounting a drill bit, only the front end 12 of the tool being visible in the drawings.

15 **[0018]** This tool 10 is able to operate in two drilling modes, respectively with and without hammer action. For that, the tool 10 is equipped with a first selector (not depicted) for selecting the mode of operation from these two drilling modes.

20 **[0019]** This first selector is situated on a housing of the tool and is accessible to the user. It may come in the form of a rotary knob that the user can move between two positions, for example spaced 180° apart, a first position for selecting the mode of drilling without hammer action, in which an arrow on the knob points for example toward a first drawing provided on the housing and depicting for example a drill bit, and a second position for selecting the mode of drilling with hammer action, in which the arrow on the knob points toward another drawing provided on the housing and depicting for example a hammer.

25 **[0020]** The front end 12 of the tool is configured to accept a drill bit via an SDS-type push-fit, which may be SDS+, SDSmax or the like. Naturally, a drill bit is chosen according to its drilling diameter, namely to the diameter of its drilling portion 18b. The diameter of its SDS attachment portion 18a however, is standard.

30 **[0021]** In the description which follows, expressions such as "axial", "radial", "longitudinal", etc. refer to the axis of the front end of the tool or to the axis of the drill bit, which in the drawings is indicated by the reference A.

35 **[0022]** The front end 12 comprises a fixed part and a rotary part rotating about the axis A. The rotating part comprises SDS-type means 14 for push-fitting the drill bit, which means will not be described in detail as they form part of the general knowledge of a person skilled in the art in this field. For an understanding of the invention it should be noted that these push-fitting means 14 comprise a rotary ring 16 which extends around the SDS-fixing portion 18a of the drill bit 18 and which comprises radial through-slots 20 in which there are mounted rollers 22 intended to engage in longitudinal grooves 24 in this portion 18a of the drill bit. A locking mechanism 26 allows the rollers 22 to be blocked radially in the grooves while at the same time allowing the drill bit a translational travel in the front end of the tool, which travel is notably dependent on the length of the grooves 24. The mechanism

26 is accessible to the user who can unlock the assembly in order to remove the drill bit or replace same.

[0023] According to the invention, the rotating part of the front end of the tool 10 further comprises means 28 for removable attachment of an extension referred to in the drawings by the reference 30.

[0024] This extension 30 is tubular and has an elongate overall shape. It is configured to extend along and around the drill bit 18, beyond its drilling tip 18c. The extension 30 comprises two opposite longitudinal ends:

- a first longitudinal end 30a configured to be connected removably to the front end of the tool, and in particular to its rotating part, so that the extension can be driven in rotation,
- a second longitudinal end 30b configured to bear at least one screw-driving element.

[0025] The connecting means 28 here comprise a tubular body 32 intended to be secured in terms of rotation to the rotating part of the front end of the tool. The body 32 is intended to extend around a portion of the ring 16 and may be secured in terms of rotation to this ring directly. For that purpose, it comprises an end portion 32a, situated on the same side as the ring 16, and configured to fit onto the ring.

[0026] This end portion 32a is surmounted by an annular seal 34 which collaborates both with the ring 16 and the aforementioned mechanism 26 to prevent the passage of dust between these components during operation. The body 32 further comprises an internal annular groove for housing another annular seal 35, such as an O-ring, which extends around the part 18a of the drill bit and engages with this portion 18a when the latter is mounted in the front end of the tool.

[0027] The body 32 further comprises, on the opposite side to its portion 32a, an end portion 32b configured to engage by male/female push-fitting with the first end 30a of the extension. In the embodiment of figures 1 to 5, this portion 32b is female and accommodates the male end 30a of the extension. However, the reverse is conceivable, as visible in the alternative form of embodiment in figure 6, in which the first end of the extension is female and accepts a male portion of the front end of the tool.

[0028] The extension 30 is intended to be set in rotation by the rotating part of the front end of the tool and therefore to rotate as one with this rotating part. This inability to rotate independently of one another can be obtained in a simple way by collaboration of shapes, the male-female push-fitting being for example performed by portions with polygonal cross sections, as in the example depicted.

[0029] The inside of the portion 32b of the body thus in cross section has a polygonal and, more precisely, hexagonal, shape which complements the cross-sectional shape of the end 30a of the extension. The end 30a of the extension thus comprises planar exterior faces uniformly distributed on its circumference and connected

one to the next by longitudinal edge corners 30b. The end 30a is, for example, of the SW13 type. As can be seen in figures 3 and 5, each edge corner 30b is interrupted by a localized recess 36. The recesses 36 are situated on the one same circumference centered on the longitudinal axis of the extension, which coincides with the axis A of the drill bit and of the front end, and form sectors of an external peripheral annular groove.

[0030] The recesses 36 are intended to collaborate with a ball retention system 38 borne by the body 32 of the connecting means 28. The ball retention system 38 comprises at least one ball 40 engaged in a radial hole in the portion 32b of the body and held in this hole by means of a split ring 42 which surrounds the portion 32b, passing over the ball. The ball 40 is prevented from escaping radially outward by this ring, and radially inward by the shape or dimensions of the hole, the radially internal opening of which may for example be of a diameter smaller than the diameter of the ball. The ball 40 is urged radially inward by the ring 42 and by default adopts a position in which it partially projects radially into the internal passage of the portion 32a into which the end 30a of the extension is push-fitted. When the extension is mounted in the front end, the ball 40 is therefore engaged in a recess 36 of the extension, allowing the extension to be retained axially in relation to the front end. A manual force to extract the extension can be applied by the user to overcome the resistance of the ball and pull the extension off the tool, in axial translation.

[0031] The extension 30 comprises an internal longitudinal bore 44 to accept a drill bit, when such a drill bit is mounted in the front end of the tool. The dimensions of this bore 44 are therefore notably dependent on those of the drill bit. In the example depicted, the bore 44 comprises two cylindrical portions 44a, 44b. The portion 44a, situated on the front-end side of the tool, has a diameter D1 so that it surrounds, with a small radial clearance, the portion 18b of the drill bit, which is of standard diameter as mentioned in the foregoing. The portion 44b, situated on the opposite side, has a diameter D2, where D2 is equal to or less than D1, so as to surround with clearance the portion 18a of the drill bit.

[0032] The example depicted is particularly well suited to a drill bit of which the diameter of its portion 18a is at most equal to the diameter of its portion 18b (in which case the diameters of the portions 44a, 44b are identical). If the diameter of the portion 18a of the drill bit were greater than the diameter of its portion 18b, the diameter of the portion 44b would be great and the alternative form of embodiment of figure 6 would be adopted because its extension is able to accommodate a drill bit of larger diameter.

[0033] The length of the portion 44a can be predetermined. The length of the portion 44b is also predetermined, so as to maintain an axial clearance between the tip 18c of the drill bit and the end 30b of the extension (figure 2). The length of the portion 44b is therefore greater than the longest length of a portion 18a of a drill bit of

diameter D2. An additional margin on this clearance may be used in order to give the possibility for translational movement of the drill bit inside the extension, particularly when a screw-driving operation is being performed while the tool is in hammer drill mode. The hammer action is not, however, needed during screw driving and therefore the drilling mode without hammer action will be favored. In operation, the extension and the drill bit are driven in rotation by the rotating part of the front end of the tool.

[0034] The end 30b of the extension 30 is configured to accommodate by male-female push-fitting, various types of end piece and coupling. It comprises a tubular wall 48 of polygonal, and more exactly hexagonal, cross section. This wall 48 comprises an annular row of flat external faces 48a and an annular row of flat internal faces 48b. Thus, a first element can be mounted on the wall 48 and engage through complementing shapes with the faces 48a, and a second element can be mounted in the wall 48 and engage, through complementing shapes, with the faces 48b. The complementing shapes allow these elements to be secured against rotation with respect to the extension.

[0035] An end-stop socket 50 or screw-driving socket 52 may for example be mounted on the wall 48 and comprise a female hexagonal portion (for example SW13) that complements the faces 48a. The end-stop socket 50 is intended to bear against a wall to limit the depth to which a fastener, such as a screw, is screwed into this wall. The screw-driving socket 52 comprises, for example, a hexagon-socket female end portion for driving a hexagon-head screw.

[0036] A screw-driving bit 54 may for example be mounted in the wall. This bit comprises a male (for example SW10) hexagonal portion complementing the faces 48b, and a screw-driving portion of flat-blade or cruciform or some other type. The bit 54 can be used in combination with the socket 50.

[0037] The insertion of the bit 54 into the wall 48 may be limited by a transverse wall 56 that closes the internal bore 44 of the extension, near its end 30b. Such closure is advantageous insofar as it makes it possible to improve the torsional strength of the extension. The axial position of the socket 50, 52 on the wall 48 can be defined by the socket pressing against an external annular flange 58 situated on the end 30b.

[0038] In the example depicted, the faces 48b of the wall are separated from one another by edge corners each comprising a localized recess 58. The recesses 58 are situated on the one same circumference centered on the longitudinal axis of the extension and form sectors of an external peripheral annular groove.

[0039] The recesses 58 are intended to engage with a ball retention system 60 borne by the socket 52 and similar to the ball retention system 38 described in the foregoing. This system 60 is intended to ensure axial retention of the socket 52 on the wall 48 of the extension.

[0040] The tool 10 is advantageously able to operate at two, drilling/screw-driving speeds which are respec-

tively high speed and low speed. For that, the tool 10 is also equipped with a speed selector 66 (figure 7). This selector 66 is situated on the casing of the tool and is accessible to the user. It may take the form of a switch that the user can move translationally between two positions, a first position for selecting the high-torque low drilling/screw-driving speed in which position an arrow on the knob points for example toward a first picture provided on the casing and depicting for example a tortoise, and a second position for selecting the low torque and high speed, in which position the arrow on the knob points toward another drawing provided on the casing and representing for example a hare.

[0041] For that, the tool preferably comprises a brushless motor 62 electronically controlled and, through the speed selector, making it possible to choose a torque and a speed that are suited to the desired function.

[0042] Figure 7 depicts an electronic control circuit for controlling the tool. This circuit comprises the motor 62 which drives the rotating part of the front end 12 of the tool. The motor 62 is connected by a microcontroller 64 to the selector 66 and to the trigger 68 for operating the tool. The microcontroller 64 is also connected to a mode selector 70 for selecting a mode with or without hammer action. The microcontroller 64 controls the motor 62 according to instructions received from the trigger 68 and from the torque/speed selector 66.

[0043] In one particular exemplary embodiment, the selector 66 is provided with a magnet which is detected by two hall-effect sensors mounted on the electronic control circuit. Detection activates one or other of the modes of use: a normal mode with a maximum rotational speed of 800 revolutions/minute and a maximum torque of 7N.m for hammer drilling and high speed, and a mode with a speed reduced to 300 revolutions/minute and a maximum torque of 15N.m for low-speed high-torque screw-driving and for hammer drilling with a lower impact force. Activation of a mode makes it possible to define the maximum rotational speed of the tool. The trigger 68 of the tool because of its progressive action makes it possible to achieve any rotational speed within the range thus defined, without the torque varying. The hall-effect sensors detect at each moment the position of the rotor of the brushless motor. The phases of the stator windings can thus be switched in the appropriate sequence.

[0044] The electronic circuit thus makes it possible to control the rotational speed of the motor very precisely, the angular position (for example the number of turns of screwing) and the tightening torque.

[0045] The speed and angular position are perfectly determined by the hall-effect sensors which detect the position of the magnets of the rotor of the motor. The tightening torque is deduced/calculated from the measurement of the current injected into the various phases of the stator of the motor. This is because current and torque are directly proportional.

[0046] In another alternative form of embodiment which has not been depicted, a screw-driving element

could be incorporated directly into the extension. The screw-driving element would then not be added on to the extension as in the aforementioned examples, but formed of one piece with this extension.

[0047] In one specific embodiment of the invention, the extension has a length of the order of 200 mm and is made of metal.

Claims

1. A drilling tool (10), configured to operate in two drilling modes, respectively with and without hammer action, said tool comprising a front end (12) equipped with a rotating part for mounting a drill bit (18) by means of an SDS-type push-fitting, **characterized in that** said rotating part comprises means (28) for removable attachment to a first longitudinal end (30a) of a tubular extension (30), the tubular extension being configured to extend along and around a drill bit mounted in the rotating part and comprising a second longitudinal end (30b) configured to bear at least one screw-driving element (50, 52, 54), such that the tool can be used for a screw-driving operation even when it is equipped with the drill bit.
2. The tool (10) as claimed in the preceding claim, in which said first end (30a) has a polygonal shape in cross section.
3. The tool (10) as claimed in claim 1 or 2, in which said connection means (28) are configured to engage with said first end (30a) by means of a male-female push-fitting.
4. The tool (10) as claimed in one of the preceding claims, in which said connection means (28) comprise a tubular body (32) configured to extend around part of the drill bit (18) and around said first end (30a).
5. The tool (10) as claimed in the preceding claim, in which said body (32) has a ball retention system (38) configured to retain said first end (30a) once connected, said ball retention system comprising at least one ball (40) that is borne by said body and is configured to cooperate by engagement with at least one recess (36) provided on said first end.
6. The tool (10) as claimed in claim 4 or 5, in which said body (32) comprises an internal annular groove for receiving a first O-ring seal (35) configured to engage with said drill bit (18).
7. The tool (10) as claimed in one of claims 4 to 6, in which said front end (12) comprises a second O-ring (34) mounted between said body (32) and SDS-type push-fitting means (14) for the drill bit (18).

8. The tool (10) as claimed in one of the preceding claims, in which it comprises a first, mode, selector (70) for selecting between said drilling modes with and without hammer action, and a second, speed, selector (66) for selecting between a first speed, suitable for hammer drilling with a high impact force and fast screw driving, and a second, lower, speed, suitable for slow, high-torque screw driving and hammer drilling with a lower impact force.
9. The tool as claimed in the preceding claim, in which it comprises a brushless motor (62) for driving the rotation of said rotating part, this motor being connected by a microcontroller (64) to said first and second selectors (66) and to a trigger (68) for actuating the tool.
10. The tool as claimed in one of the preceding claims, in which said rotating part is able not to transmit hammer actions to said extension (30).
11. An assembly comprising a tool as claimed in one of claims 1 to 10 and a tubular extension (30), said extension having an elongate shape and comprising a first longitudinal end (30a) for removable attachment to said connection means (28) of the front end (12) of the tool, and a second longitudinal end (30b) configured to bear at least one screw-driving element (50, 52, 54), the extension comprising a longitudinal internal bore (44) which is open at said first end and of which the length and the external diameter are configured such that the extension can be mounted on the tool even when the tool is equipped with a drill bit (18).
12. The assembly as claimed in the preceding claim, in which said bore (44) comprises at least two cylindrical portions (44a, 44b) of different diameters, including a first portion (44a) of larger diameter located toward said first end (30a).
13. The assembly as claimed in claim 11 or 12, in which said second end (30b) is configured to receive at least one element (50, 52, 54) affixed by male or female push-fitting, or even two elements affixed by male and female push-fitting, respectively.
14. The assembly as claimed in one of claims 11 to 13, in which said second end (30b) has a polygonal shape in cross section.

Patentansprüche

1. Bohrwerkzeug (10), so konfiguriert, dass es in zwei Bohrmodi betrieben werden kann, jeweils mit und ohne Schlagaktion, wobei das Werkzeug ein vorderes Ende (12) aufweist, das mit einem drehenden

- Teil zum Anbringen einer Bohrspitze (18) mittels einer SDS-artigen Steckverbindung ausgestattet ist, **dadurch gekennzeichnet, dass** das drehende Teil Mittel (28) zur entfernbaren Befestigung an einem ersten Längsende (30a) einer rohrförmigen Verlängerung (30) aufweist, wobei die rohrförmige Verlängerung so konfiguriert ist, dass sie sich entlang und um eine Bohrspitze erstreckt, die in dem drehenden Teil angebracht ist, und ein zweites Längsende (30b) aufweist, das so konfiguriert ist, dass es zumindest ein Schraubenantriebsselement (50, 52, 54) trägt, so dass das Werkzeug auch dann, wenn es mit der Bohrspitze ausgestattet ist, für einen Schraubvorgang verwendet werden kann.
2. Werkzeug (10) nach dem vorhergehenden Anspruch, wobei das erste Ende (30a) im Querschnitt eine polygonale Form aufweist.
 3. Werkzeug (10) nach Anspruch 1 oder 2, wobei die Verbindungsmittel (28) so konfiguriert sind, dass sie mit dem ersten Ende (30a) mittels einer Stecker-Buchse-Steckverbindung in Eingriff kommen.
 4. Werkzeug (10) nach einem der vorhergehenden Ansprüche, wobei die Verbindungsmittel (28) einen rohrförmigen Körper (32) aufweisen, der so konfiguriert ist, dass er sich um einen Teil der Bohrspitze (18) und um das erste Ende (30a) erstreckt.
 5. Werkzeug (10) nach dem vorhergehenden Anspruch, wobei der Körper (32) ein Kugelrückhaltesystem (38) aufweist, das so konfiguriert ist, dass es das erste Ende (30a) zurückhält, sobald es verbunden ist, wobei das Kugelrückhaltesystem zumindest eine Kugel (40) aufweist, die von dem Körper getragen wird und so konfiguriert ist, dass sie durch Eingriff mit zumindest einer Ausnehmung (36) zusammenwirkt, die an dem ersten Ende vorgesehen ist.
 6. Werkzeug (10) nach Anspruch 4 oder 5, wobei der Körper (32) eine innere ringförmige Nut zum Aufnehmen einer ersten O-Ring-Dichtung (35) aufweist, die so konfiguriert ist, dass sie mit der Bohrspitze (18) in Eingriff kommt.
 7. Werkzeug (10) nach einem der Ansprüche 4 bis 6, wobei das vordere Ende (12) einen zweiten O-Ring (34) aufweist, der zwischen dem Körper (32) und dem SDS-artigen Steckverbindungsmittel (14) für die Bohrspitze (18) angebracht ist.
 8. Werkzeug (10) nach einem der vorhergehenden Ansprüche, wobei dieses einen ersten (Modus)-Wähler (70) zum Auswählen zwischen den Bohrmodi mit und ohne Schlagaktion und einen zweiten (Drehzahl)-Wähler (66) zum Auswählen zwischen einer ersten Drehzahl, die zum Schlagbohren mit hoher Schlagkraft und zum schnellen Einschrauben geeignet ist, und einer zweiten, niedrigeren Drehzahl, die zum langsamen Einschrauben mit hohem Drehmoment und zum Schlagbohren mit einer niedrigeren Schlagkraft geeignet ist, aufweist.
 9. Werkzeug nach dem vorhergehenden Anspruch, wobei dieses einen bürstenlosen Motor (62) aufweist, um das drehende Teil in Drehung zu versetzen, wobei dieser Motor über einen Mikrocontroller (64) mit dem ersten und zweiten Wähler (66) und einem Auslöser (68) zum Betätigen des Werkzeugs verbunden ist.
 10. Werkzeug nach einem der vorhergehenden Ansprüche, wobei das drehende Teil in der Lage ist, keine Schlagaktionen auf die Verlängerung (30) zu übertragen.
 11. Anordnung, die ein Werkzeug nach einem der Ansprüche 1 bis 10 und eine rohrförmige Verlängerung (30) aufweist, wobei die Verlängerung eine längliche Form aufweist und ein erstes Längsende (30a) zur entfernbaren Befestigung an den Verbindungsmitteln (28) des vorderen Endes (12) des Werkzeugs, und ein zweites Längsende (30b), das so konfiguriert ist, dass es zumindest ein Schraubenantriebsselement (50, 52, 54) trägt, aufweist, wobei die Verlängerung eine längsverlaufende Innenbohrung (44) aufweist, die an dem ersten Ende offen ist und deren Länge und Außendurchmesser so konfiguriert sind, dass die Verlängerung auch dann an dem Werkzeug angebracht werden kann, wenn das Werkzeug mit einer Bohrspitze (18) ausgestattet ist.
 12. Anordnung nach dem vorhergehenden Anspruch, wobei die Bohrung (44) zumindest zwei zylindrische Abschnitte (44a, 44b) mit unterschiedlichen Durchmessern aufweist, die einen ersten Abschnitt (44a) mit größerem Durchmesser beinhalten, der in Richtung des ersten Endes (30a) angeordnet ist.
 13. Anordnung nach Anspruch 11 oder 12, wobei das zweite Ende (30b) so konfiguriert ist, dass es zumindest ein Element (50, 52, 54), das durch eine Stecker- oder Buchsen-Steckverbindung befestigt ist, oder auch zwei Elemente, die jeweils durch eine Stecker- und eine Buchsen-Steckverbindung befestigt sind, aufnimmt.
 14. Anordnung nach einem der Ansprüche 11 bis 13, wobei das zweite Ende (30b) im Querschnitt eine polygonale Form aufweist.

Revendications

1. Outil de forage (10), configuré pour fonctionner dans

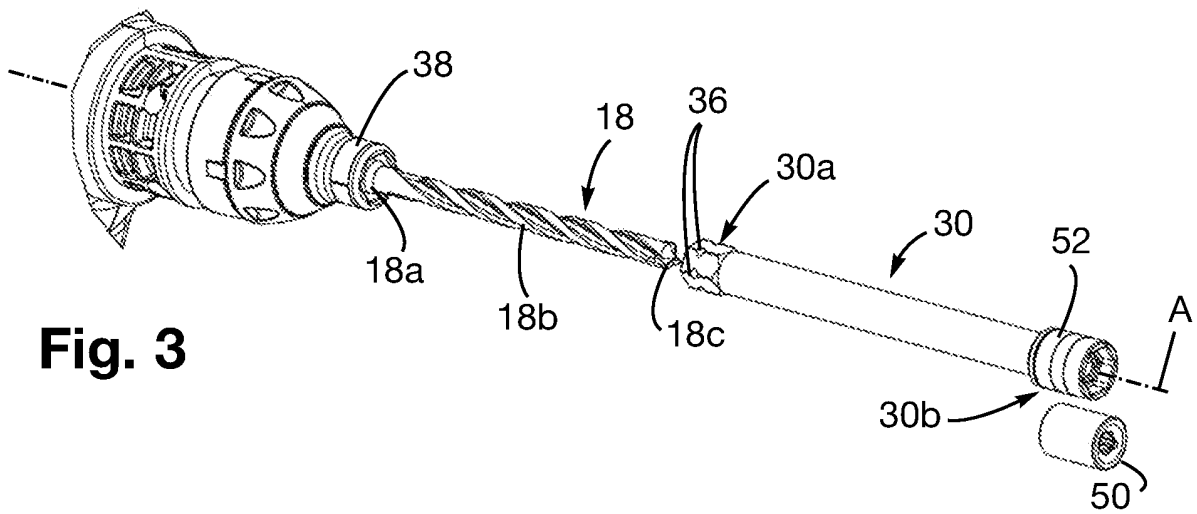
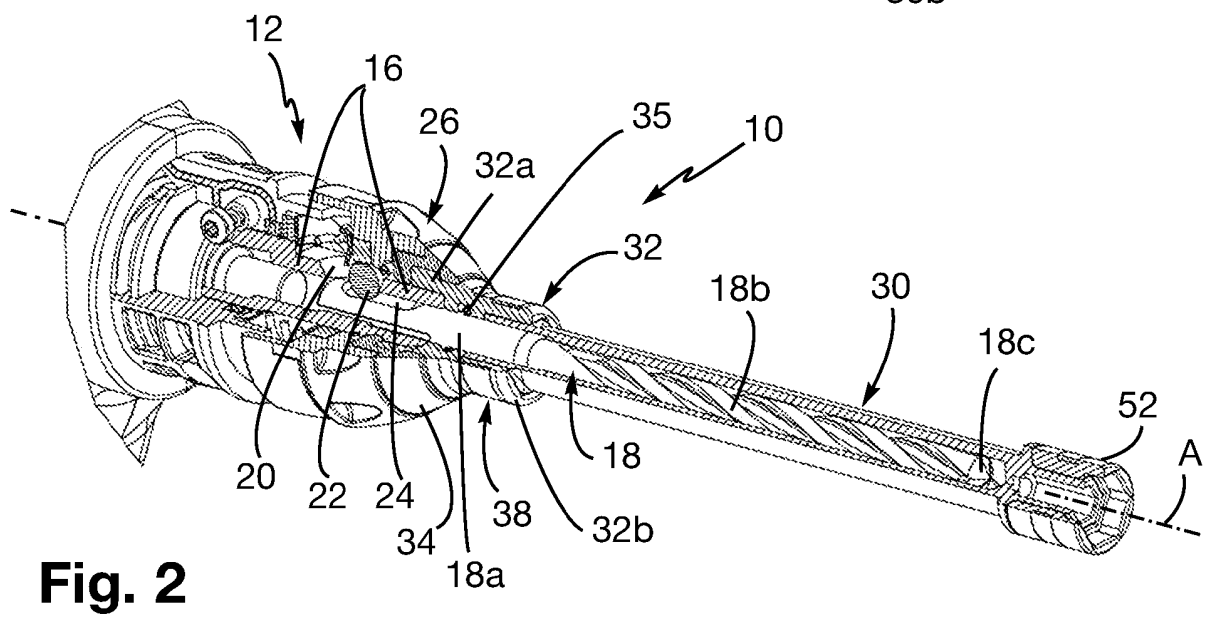
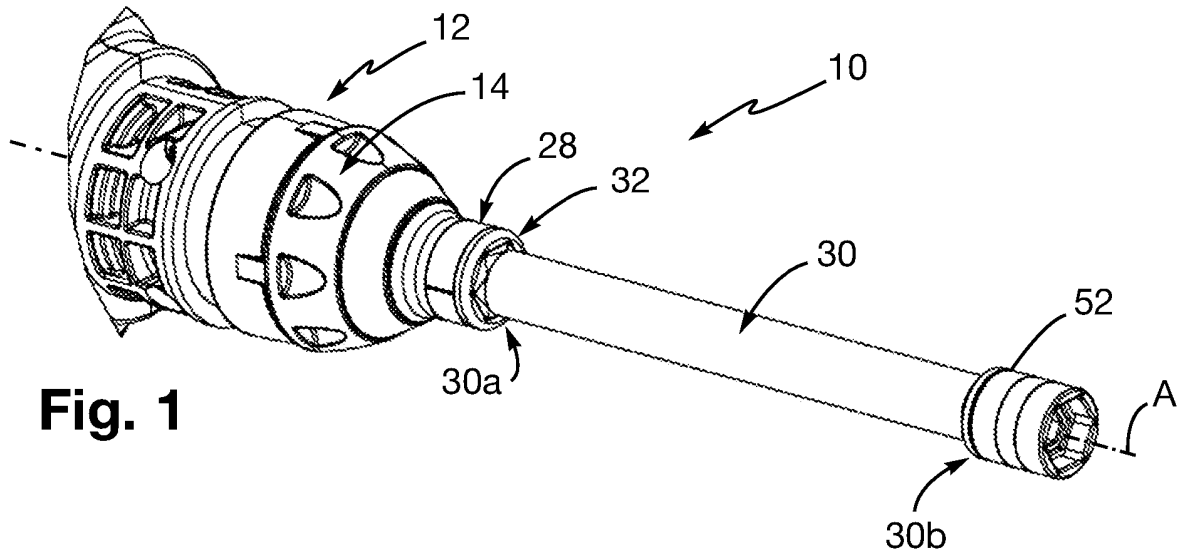
deux modes de forage, respectivement avec et sans action de marteau, ledit outil comprenant une extrémité avant (12) équipée d'une partie rotative pour le montage d'un foret (18) au moyen d'un emmanchement de type SDS,

caractérisé en ce que ladite partie rotative comprend des moyens (28) pour une fixation amovible à une première extrémité longitudinale (30a) d'une extension tubulaire (30), l'extension tubulaire étant configurée pour s'étendre le long et autour d'un foret monté dans la partie rotative et comprenant une deuxième extrémité longitudinale (30b) configurée pour supporter au moins un élément d'entraînement de vis (50, 52, 54), de sorte que l'outil peut être utilisé pour une opération de vissage même lorsqu'il est équipé avec le foret.

2. Outil (10) selon la revendication précédente, dans lequel ladite première extrémité (30a) a une forme polygonale en coupe transversale. 20
3. Outil (10) selon la revendication 1 ou 2, dans lequel lesdits moyens de connexion (28) sont configurés pour s'engager avec ladite première extrémité (30a) au moyen d'un emmanchement mâle-femelle. 25
4. Outil (10) selon l'une quelconque des revendications précédentes, dans lequel lesdits moyens de connexion (28) comprennent un corps tubulaire (32) configuré pour s'étendre autour d'une partie du foret (18) et autour de ladite première extrémité (30a). 30
5. Outil (10) selon la revendication précédente, dans lequel ledit corps (32) a un système de retenue de bille (38) configuré pour retenir ladite première extrémité (30a) une fois connectée, ledit système de retenue de bille comprenant au moins une bille (40) qui est portée par ledit corps et est configurée pour coopérer par engagement avec au moins un élément (36) fourni sur ladite première extrémité. 40
6. Outil (10) selon la revendication 4 ou 5, dans lequel ledit corps (32) comprend une rainure annulaire interne pour la réception d'un premier joint torique (35) configuré pour s'engager avec ledit foret (18). 45
7. Outil (10) selon l'une quelconque des revendications 4 à 6, dans lequel ladite extrémité avant (12) comprend un deuxième joint torique (34) monté entre ledit corps (32) et des moyens d'emmanchement de type SDS (14) pour le foret (18). 50
8. Outil (10) selon l'une quelconque des revendications précédentes, dans lequel il comprend un premier sélecteur de mode (70) pour la sélection entre lesdits modes de forage avec et sans action de marteau, et un deuxième sélecteur de vitesse (66) pour la sélection entre une première vitesse, appropriée pour le

forage par marteau avec une force d'impact élevée et un entraînement de vis rapide, et une deuxième vitesse, inférieure, appropriée pour un entraînement de vis lent et un forage par marteau à couple élevé avec une force d'impact inférieure

9. Outil selon la revendication précédente, dans lequel il comprend un moteur sans balais (62) pour l'entraînement en rotation de ladite pièce rotative, ce moteur étant connecté par un microcontrôleur (64) auxdits premier et deuxième sélecteurs (66) et à une gâchette (68) pour l'actionnement de l'outil. 10
10. Outil selon l'une des revendications précédentes, dans lequel ladite partie rotative est capable de ne pas transmettre les actions de marteau à ladite extension (30). 15
11. Ensemble comprenant un outil selon l'une quelconque des revendications 1 à 10 et une extension tubulaire (30), ladite extension ayant une forme allongée et comprenant une première extrémité longitudinale (30a) pour une fixation amovible auxdits moyens de connexion (28) de l'extrémité avant (12) de l'outil, et une deuxième extrémité longitudinale (30b) configurée pour supporter au moins un élément de vissage (50, 52, 54), l'extension comprenant un alésage interne longitudinal (44) qui est ouvert au niveau de ladite première extrémité et dont la longueur et le diamètre externe sont configurés de sorte que l'extension puisse être montée sur l'outil même lorsque l'outil est équipé avec un foret (18). 20
12. Ensemble selon la revendication précédente, dans lequel ledit alésage (44) comprend au moins deux parties cylindriques (44a, 44b) de diamètres différents, comprenant une première portion (44a) de diamètre plus grand située vers ladite première extrémité (30a). 35
13. Ensemble selon la revendication 11 ou 12, dans lequel ladite deuxième extrémité (30b) est configurée pour recevoir au moins un élément (50, 52, 54) fixé par emmanchement mâle ou femelle, ou même deux éléments fixés par emmanchement mâle et femelle, respectivement. 40
14. Ensemble selon l'une quelconque des revendications 11 à 13, dans lequel ladite deuxième extrémité (30b) a une forme polygonale en section transversale. 50



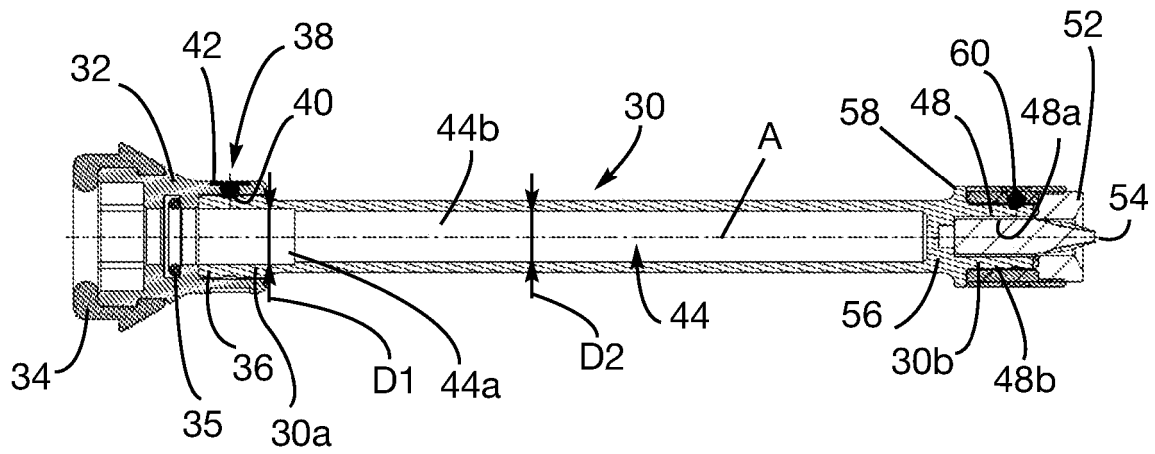


Fig. 4

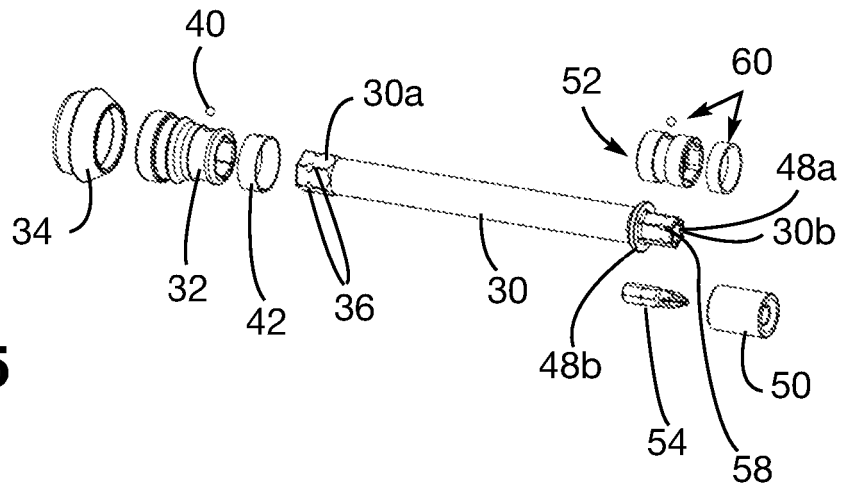


Fig. 5

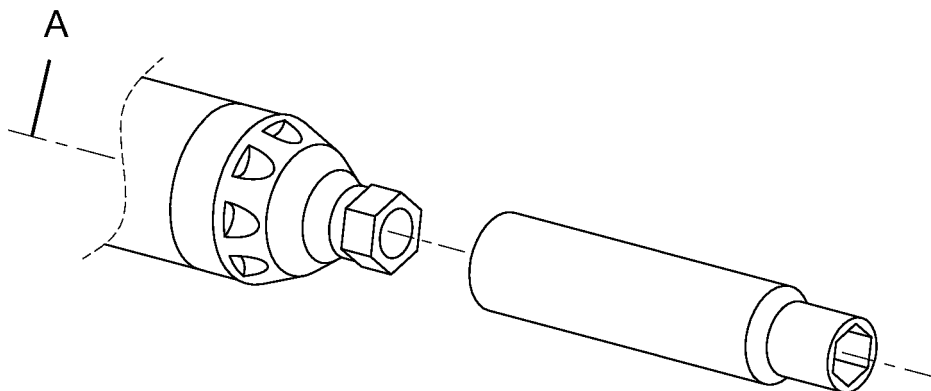


Fig. 6

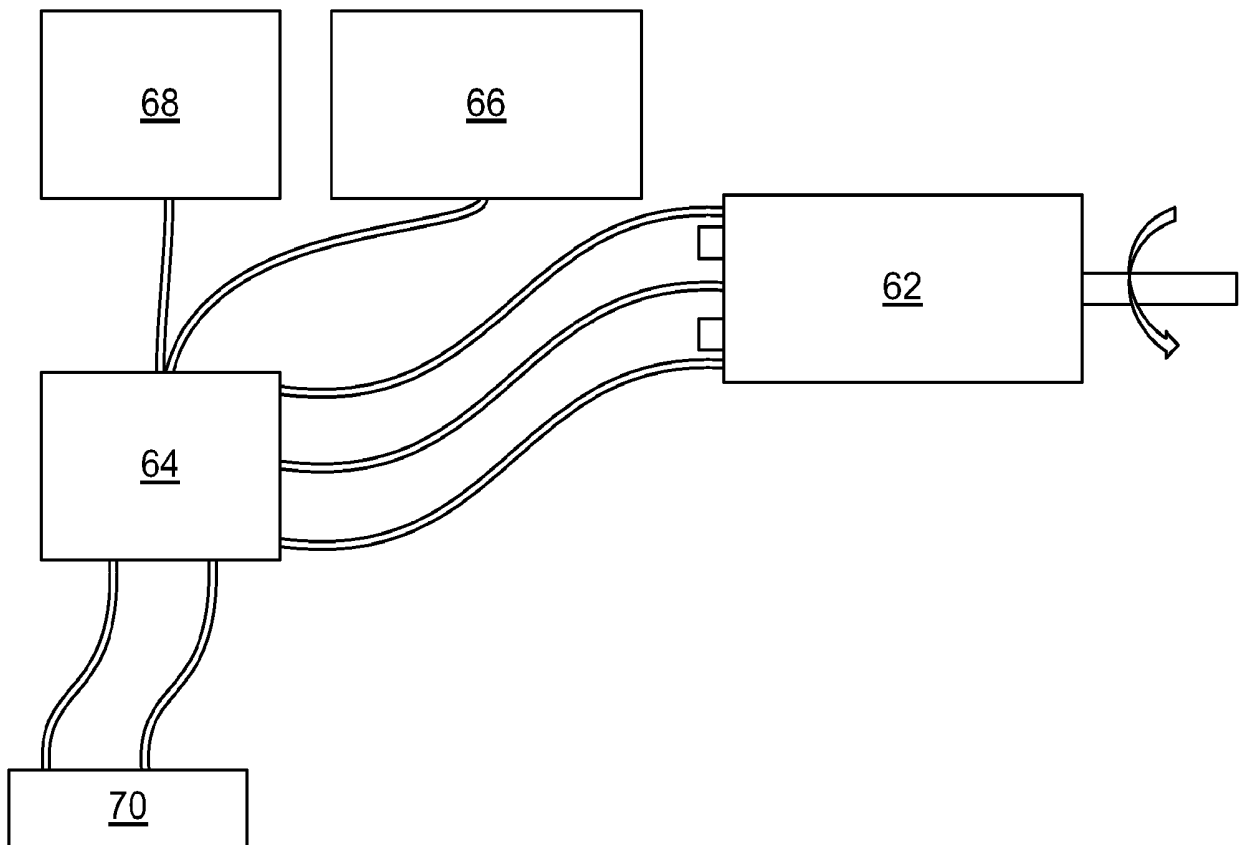


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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